Updated Reference Viscosity Model for Hydrogen Sulfide

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Recently, the friction theory (f-theory) for viscosity modeling has been used to accurately model the viscosity behavior of hydrogen sulfide (Schmidt et. al (2008)). During the development of this viscosity model, the literature review identified significant regions where additional data are needed to fill voids, resolve discrepancies of existing data sets and to extend regions where the viscosity may be insufficiently modeled with the current techniques. Based on the findings, new experimental measurements and/or molecular simulations, were suggested to expand the data set. Although the developed model was based on limited data, the derived model has a sound physical reasoning which gave good results over wide ranges of the H_2S *T-η-P* surface. As a result of the analysis, new experimental viscosities of H_2S in the critical areas identified in the initial viscosity model have recently been published. The current update to the data set consists of experimental H_2S viscosities up to 100 MPa at temperatures between 273 K and 423 K (Giri et. al (2011)). These high-pressure data have been used to update the residual friction term of the original viscosity model. Additionally, low-density viscosity data measured at temperatures ranging from 292 K to 682 K (Vogel (2011)) and dilute gas limit molecular simulation results (Hellman et. al 2011) were available to update the dilute gas viscosity correlation. These new data sets have been used to update the H_2S f-theory reference viscosity model at a wide range of conditions were no experimental data have been previously available. In addition, the current updated viscosity model was used to improve the scaling parameters needed for the one-parameter f-theory models. These models have been shown to be highly flexible and a powerful tool to model the viscosity of reservoir fluids, ranging from light to heavy fluids, under broad conditions of temperature, pressure and composition. The updated one-parameter model was tested against experimental viscosities of multi-component mixtures containing H_2S.